plurality of magnetic elements spans substantially from the top end to the bottom end of the process chamber; and

a device for rotating magnetic fields of the plurality of magnetic elements so that each magnetic field of each magnetic element is individually rotated at a same angular speed and angular direction around an individual axis of rotation passing through the magnetic element to change said cusp pattern with respect to said wall connected between the plurality of magnetic elements and the process chamber.

2. The apparatus, as recited in claim 1, further comprising a chuck within the process chamber for supporting the substrate within the process chamber.

3. (Once Amended) The apparatus, as recited in claim 2, further comprising an RF antenna adjacent to and outside of the process chamber.

4. (Once Amended) The apparatus, as recited in claim 3, wherein said magnetic elements are permanent magnets and each magnetic element has a length that extends substantially from the top end to the bottom end of the process chamber.

5. (Once Amended) The apparatus, as recited in claim 3, wherein said plurality of magnetic elements is at least 32 magnetic elements.

6. The apparatus, as recited in claim 3, wherein said device for changing said cusp pattern continuously changes the cusp pattern on said wall.

7. The apparatus, as recited in claim 3, wherein said device for changing said cusp pattern incrementally changes the cusp pattern on said wall.

8. (Once Amended) The apparatus, as recited in claim 4, wherein the axis of rotation for each magnetic element extends along the length of the magnetic element.

9. (Twice Amended) The apparatus, as recited in claim 3, wherein said plurality of magnetic elements are electromagnets.

10. (Twice Amended) The apparatus, as recited in claim 9, wherein said device for rotating magnetic fields comprises a device for varying current in the electromagnets.

11. (Twice Amended) The apparatus, as recited in claim 3, wherein each magnetic element comprises a first electromagnet and a second electromagnet, and wherein the device for rotating the magnetic fields comprises an electrical control for varying the current in the first electromagnet and the second electromagnet, so that the current in the first electromagnetic element is out of phase with the current in the second electromagnetic element.

28. (Twice Amended) A plasma processing apparatus for processing a substrate, comprising:

a process chamber, defined at least in part by a top end and a bottom end and a wall extending between the top end and the bottom end, within which a plasma is ignited and sustained for said processing;

a magnetic array having a plurality of magnetic elements that are disposed around the periphery of said process chamber around the outside of said wall, said plurality of magnetic elements being configured to produce an azimuthally symmetric radial gradient magnetic field establishing a plurality of cusp patterns on said wall, and wherein each of the plurality of magnetic elements span substantially from the top end to the bottom end of the process chamber; and

a device for rotating magnetic fields of each of the plurality of magnetic elements so that each magnetic field of each magnetic element is individually rotated at a same speed and angular direction around an individual axis of rotation passing through the magnetic element to move said cusp patterns with respect to said wall connected between the plurality of magnetic elements and the process chamber.

29. The plasma processing apparatus, as recited in claim 28, wherein each magnetic element is axially oriented about the periphery of the process chamber.

30. (Once Amended) The plasma processing apparatus, as recited in claim 29, further comprising an RF antenna adjacent to and outside of the process chamber.

31. The plasma processing apparatus, as recited in claim 30, wherein the plurality of magnetic elements create a stronger magnetic field at the wall and a weaker magnetic field above the substrate.

32. The plasma processing apparatus, as recited in claim 31, wherein the weaker magnetic field above the substrate is about zero Gauss and the stronger magnetic field at the wall is between about 15 to about 1500 Gauss.

33. The plasma processing apparatus, as recited in claim 30, wherein the plurality of magnetic elements are permanent magnets.

34. The plasma processing apparatus, as recited in claim 30, wherein the process chamber has a chamber axis that extends across a height of the process chamber, and wherein the rotation axis of the at least one magnetic element is parallel to the chamber axis.

35. The plasma processing apparatus, as recited in claim 28, wherein each magnetic element comprises a north magnetic pole and a south magnetic pole, wherein the north magnetic pole and the south magnetic pole of each magnetic element is aligned to face a magnetic pole of an adjacent magnetic element along a circumference around the process chamber, wherein the magnetic elements are disposed around said process chamber to create a azimuthally symmetric radial gradient.

36. The plasma processing apparatus, as recited in claim 35, wherein the plurality of magnetic elements are permanent magnets.

37. (New) The plasma processing apparatus, as recited in claim 28, wherein the process chamber has a chamber axis that extends across a height of the process chamber, and wherein the rotation axis of the at least one magnetic element is parallel to the chamber axis.

38. (New) The plasma processing apparatus, as recited in claim 37, wherein each magnetic element has a length, wherein the axis of rotation for each magnetic element extends along the length of the magnetic element.

39. (New) The plasma processing apparatus, as recited in claim 28, wherein each magnetic element comprises a first electromagnet and a second electromagnet, wherein the device for rotating the magnetic fields comprises an electrical control for varying the current in the first electromagnet and the second electromagnet so that the current in the first electromagnet is out of phase with the current in the second electromagnet.